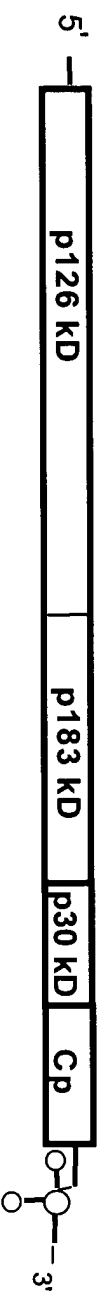


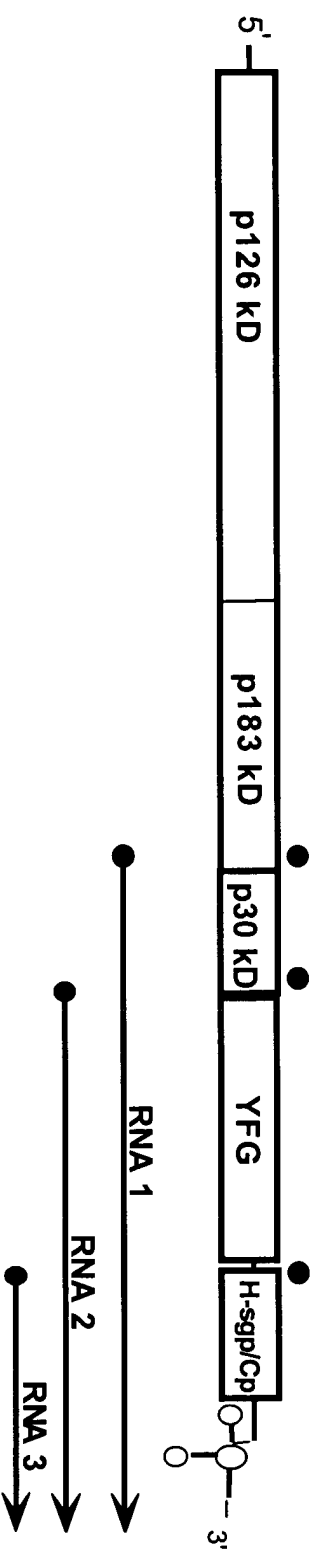
# FIG. 1

## Tobamovirus Expression Vectors

### TMV



### TMV-Expression Vector



# FIG. 2

## Tobamovirus Vector for rGal-A Expression

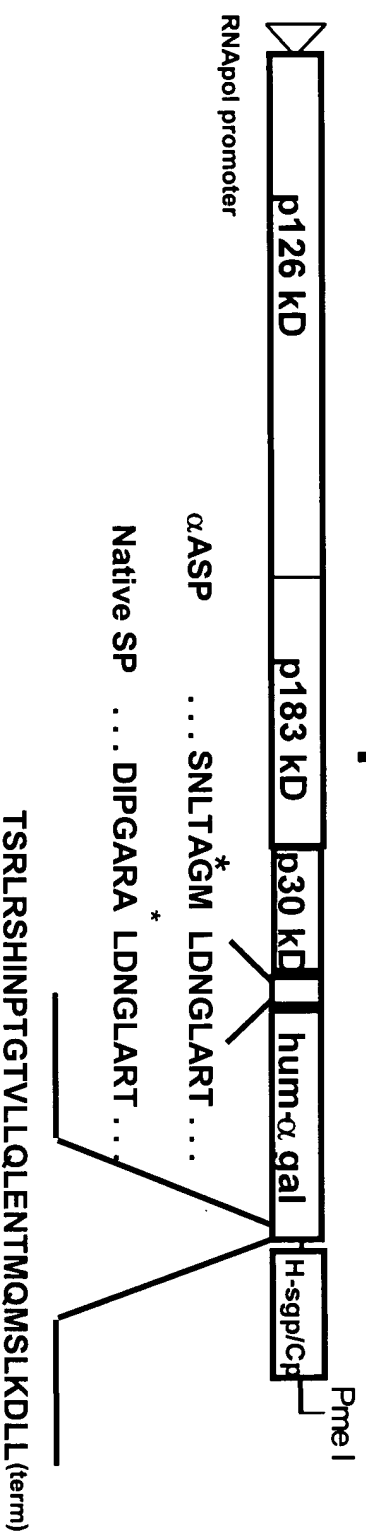
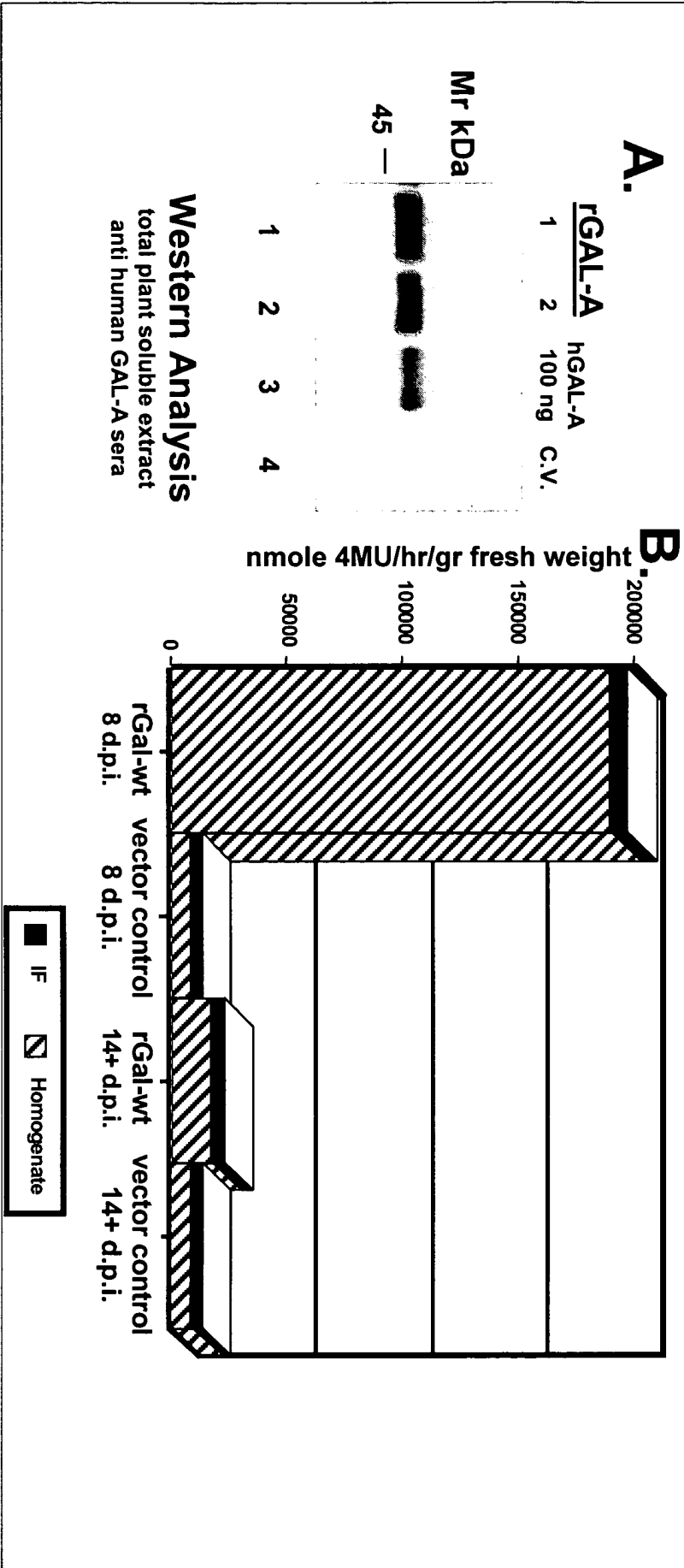


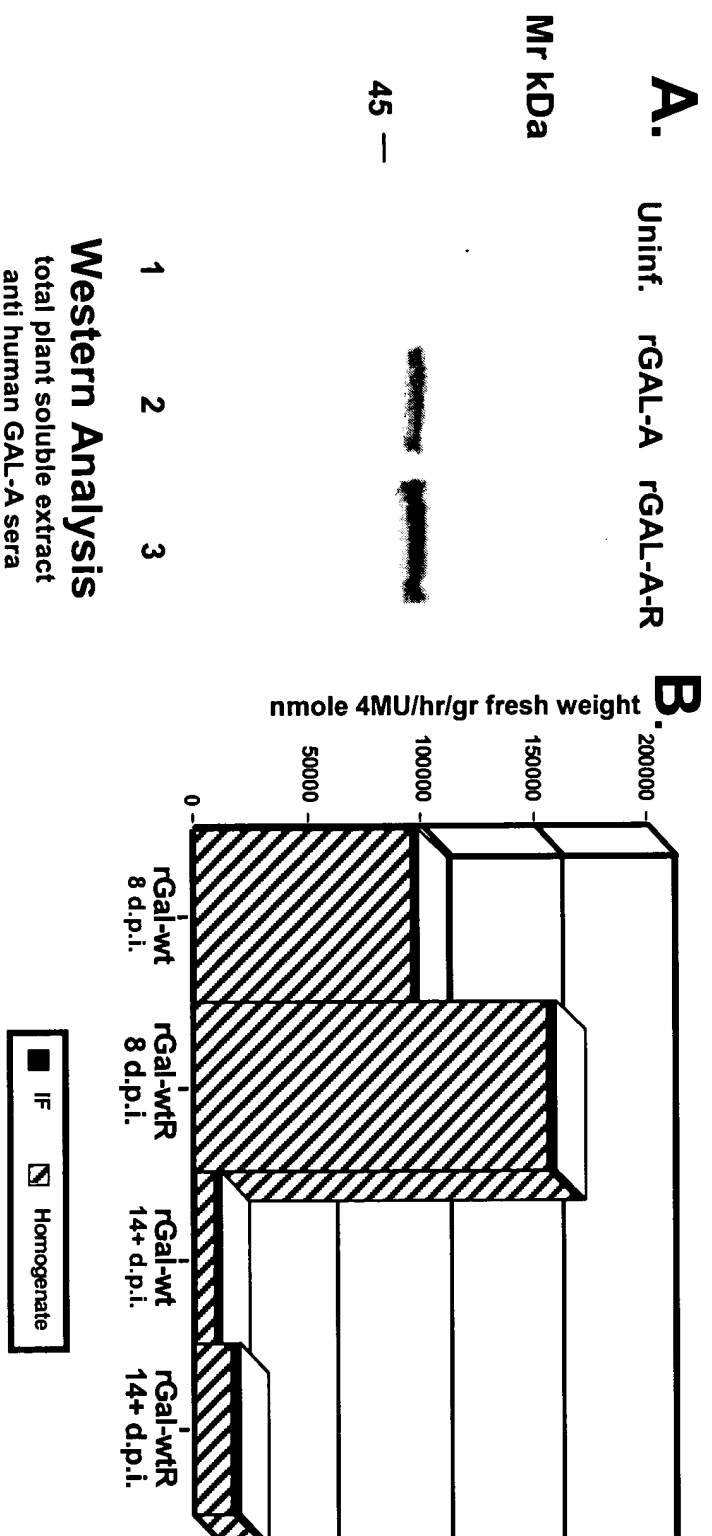
FIG. 3

Accumulation and Activity of WT rGal-A



**FIG. 4**

# Accumulation and Activity of WT and ER-Targeted rGal-A



**FIG. 5**

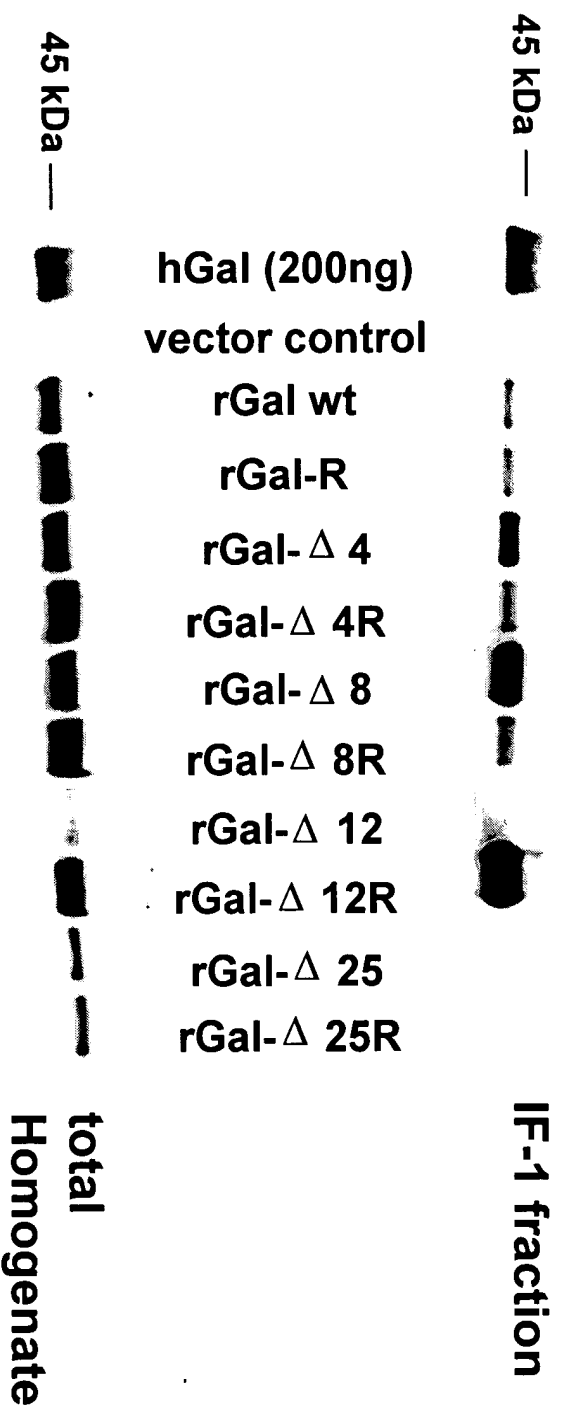
**Carboxy-Modifications to rGal-A**

	-30	- 20	-10
WT	TSRLRSHINPTGTVLLQLENTMQMSLKDLL		
WTR	TSRLRSHINPTGTVLLQLENTMQMSLKDLLSEKDEL		
Δ4	TSRLRSHINPTGTVLLQLENTMQMSL		
Δ4R	TSRLRSHINPTGTVLLQLENTMQMSLSEKDEL		
Δ8	TSRLRSHINPTGTVLLQLENTM		
Δ8R	TSRLRSHINPTGTVLLQLENTMSEKDEL		
Δ12	TSRLRSHINPTGTVLLQL		
Δ12R	TSRLRSHINPTGTVLLQLSEKDEL		
Δ25	TSRLR		
Δ25R	TSRLRSEKDEL		
Control virus (GFP, AMP, IFN g)			

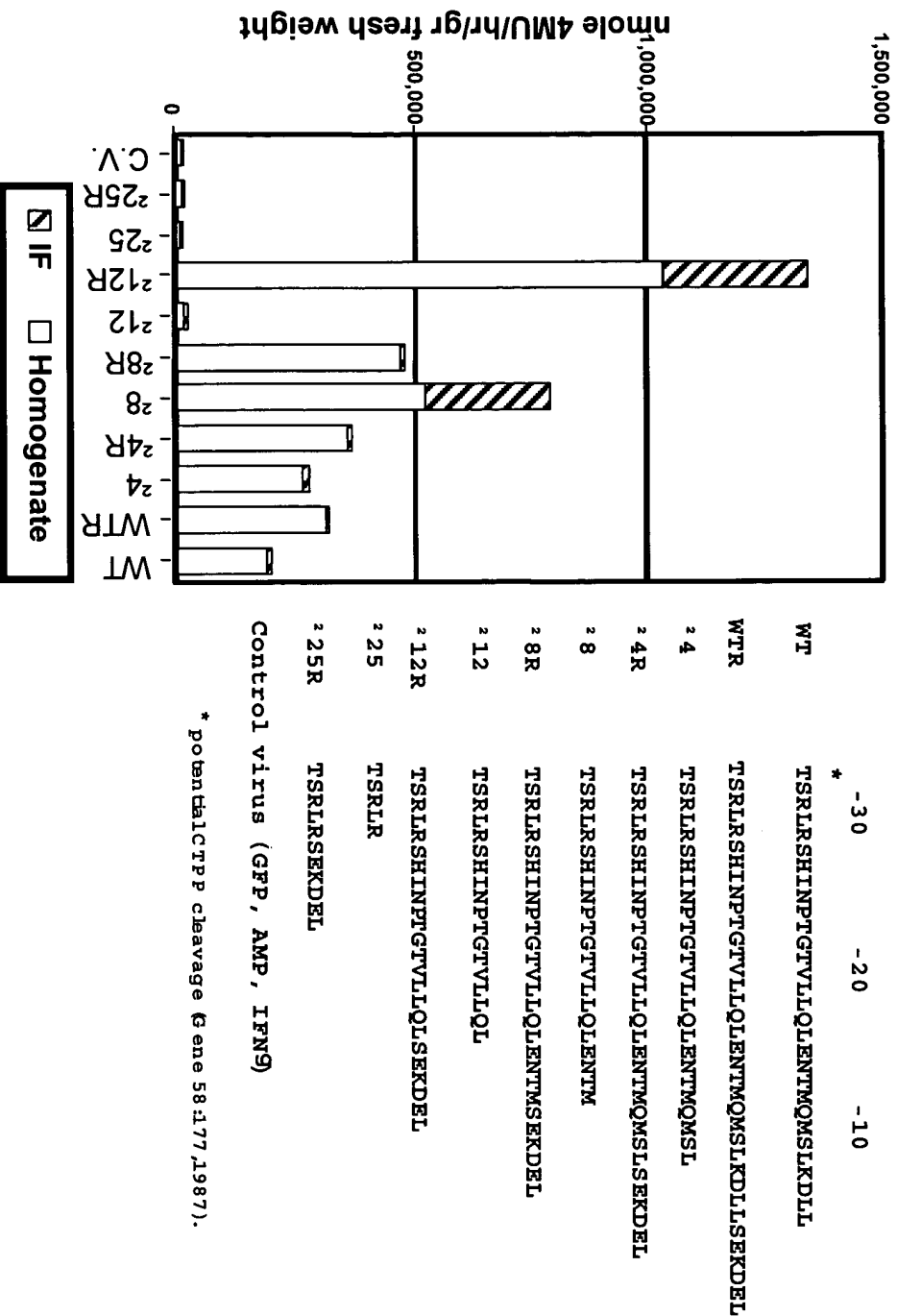
\* potential CTPP cleavage (Gene 58:177,1987) .

\* potential CTPP cleavage (Gene 58:177,1987) .

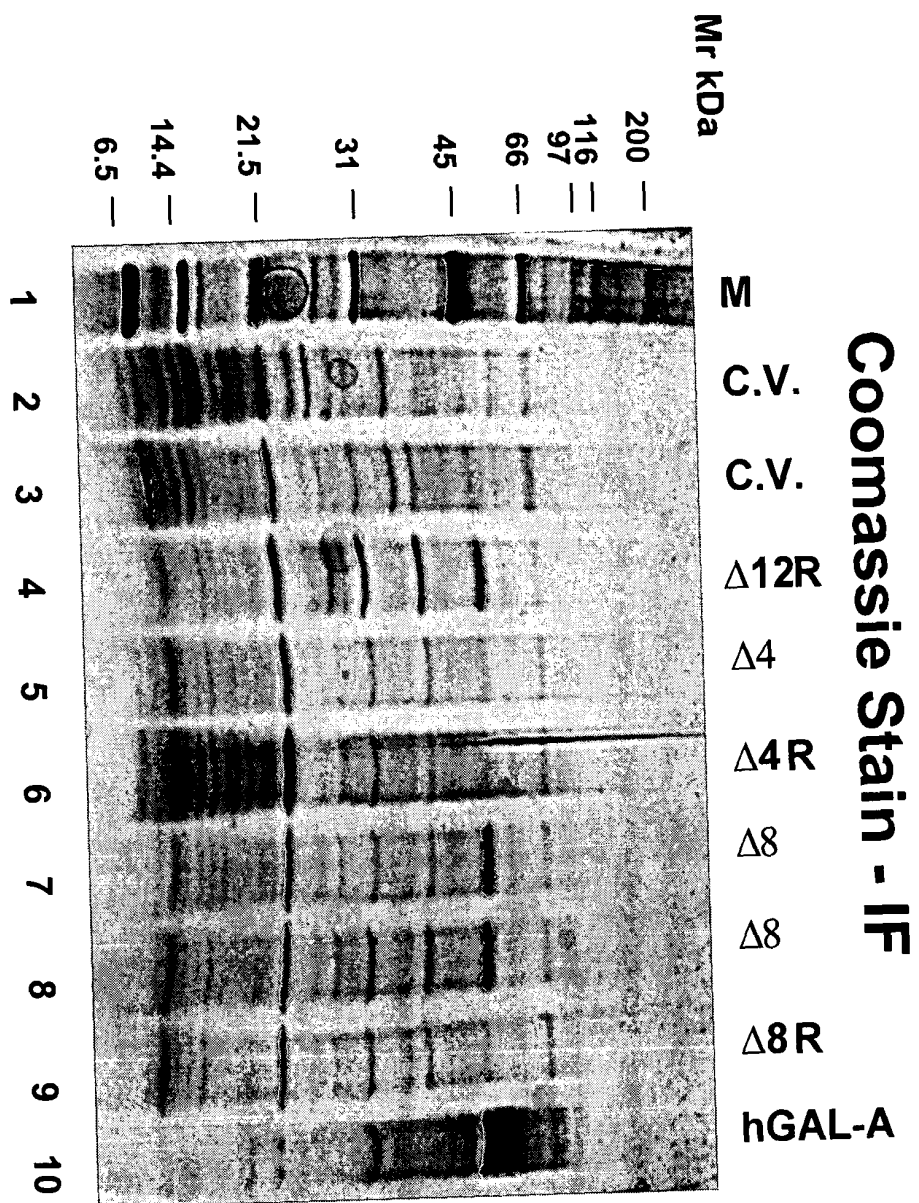
**Fig. 6**  
**Western Blot Analysis of**  
**Carboxy-modified rGal-A**



# FIG. 7 Enzymatic Activity of Carboxy-Modified rGal-A



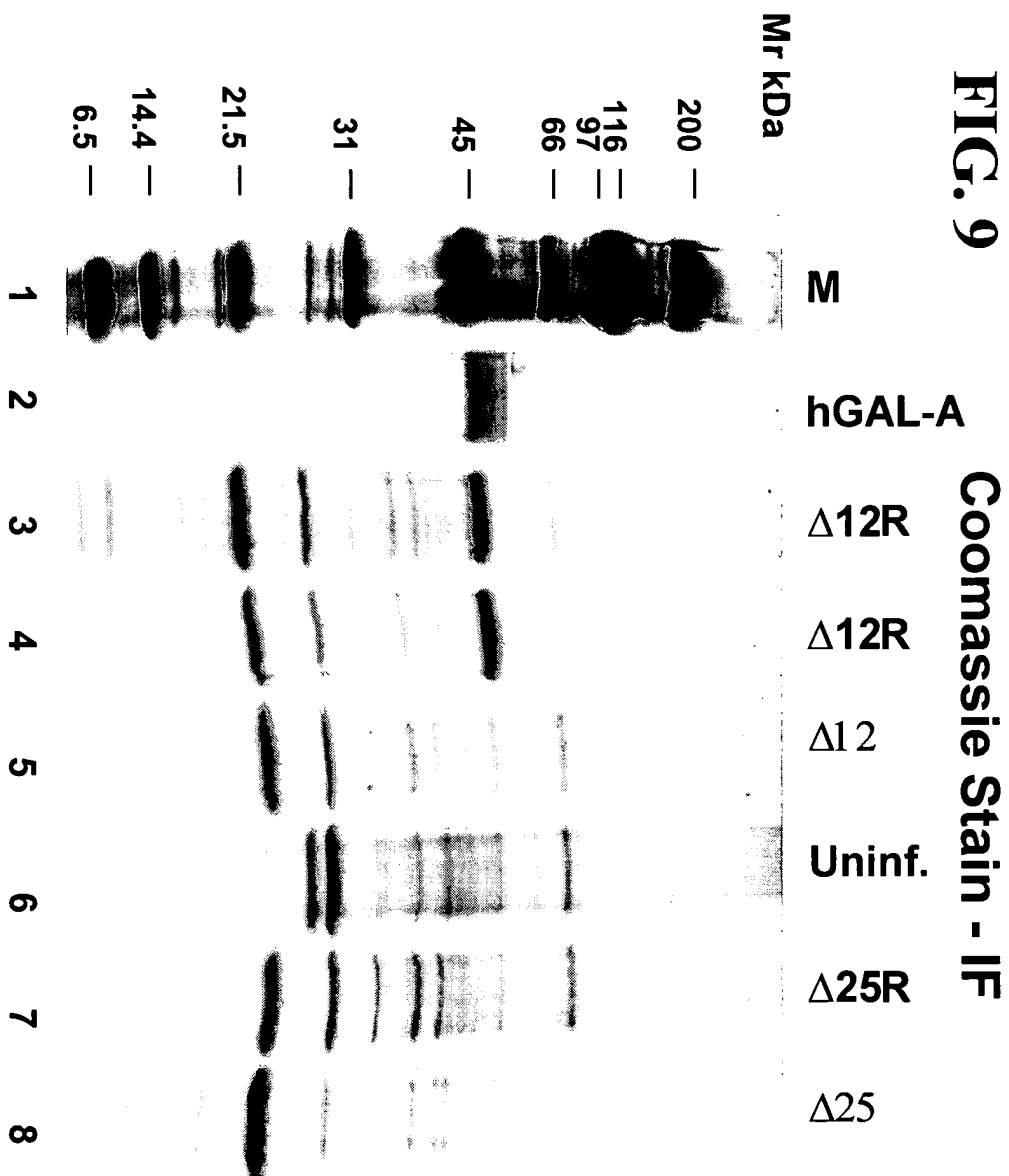
**FIG. 8**



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**FIG. 9**



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**FIG. 10**

**Schematic of rGal-A Secretion**

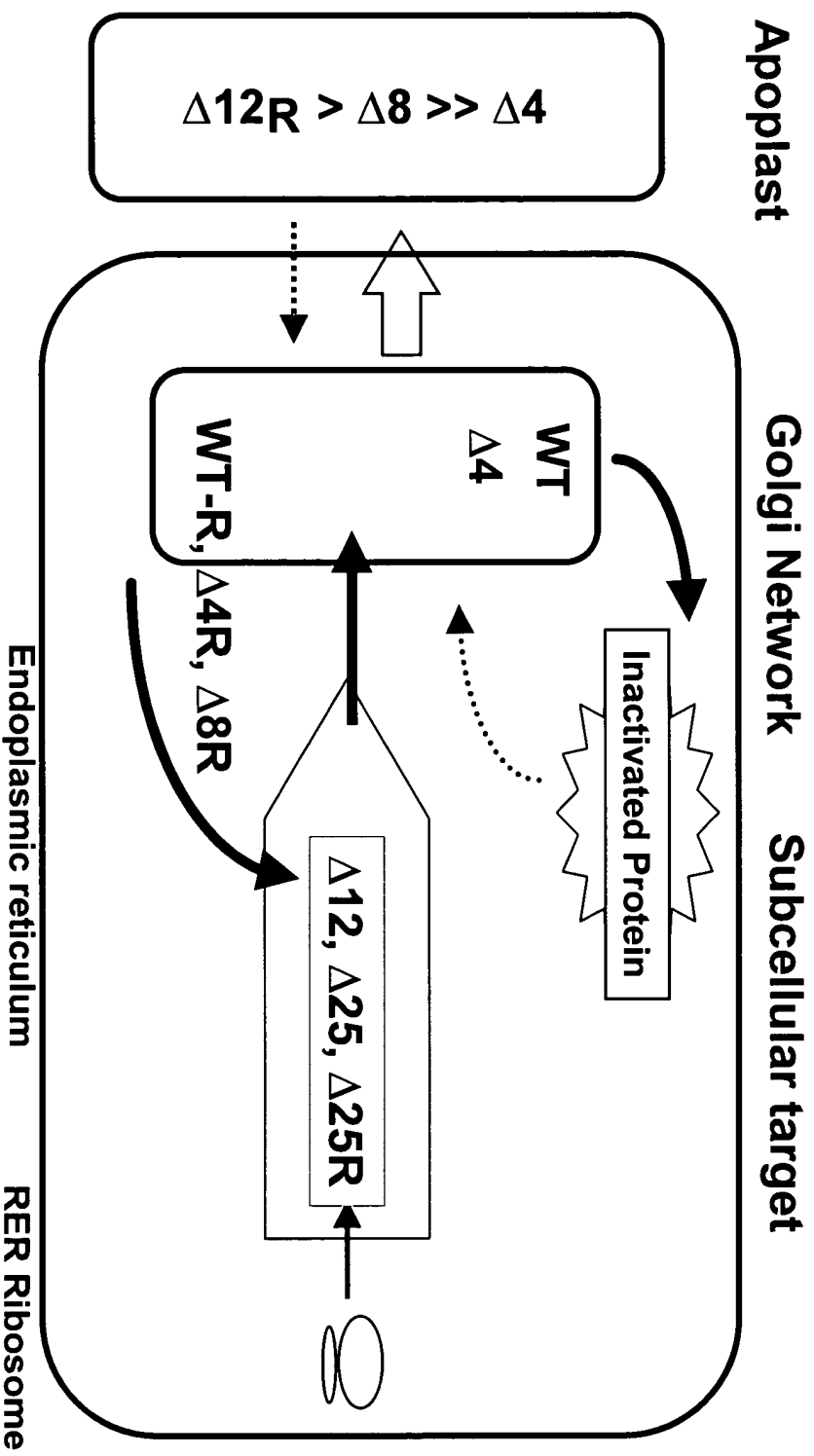
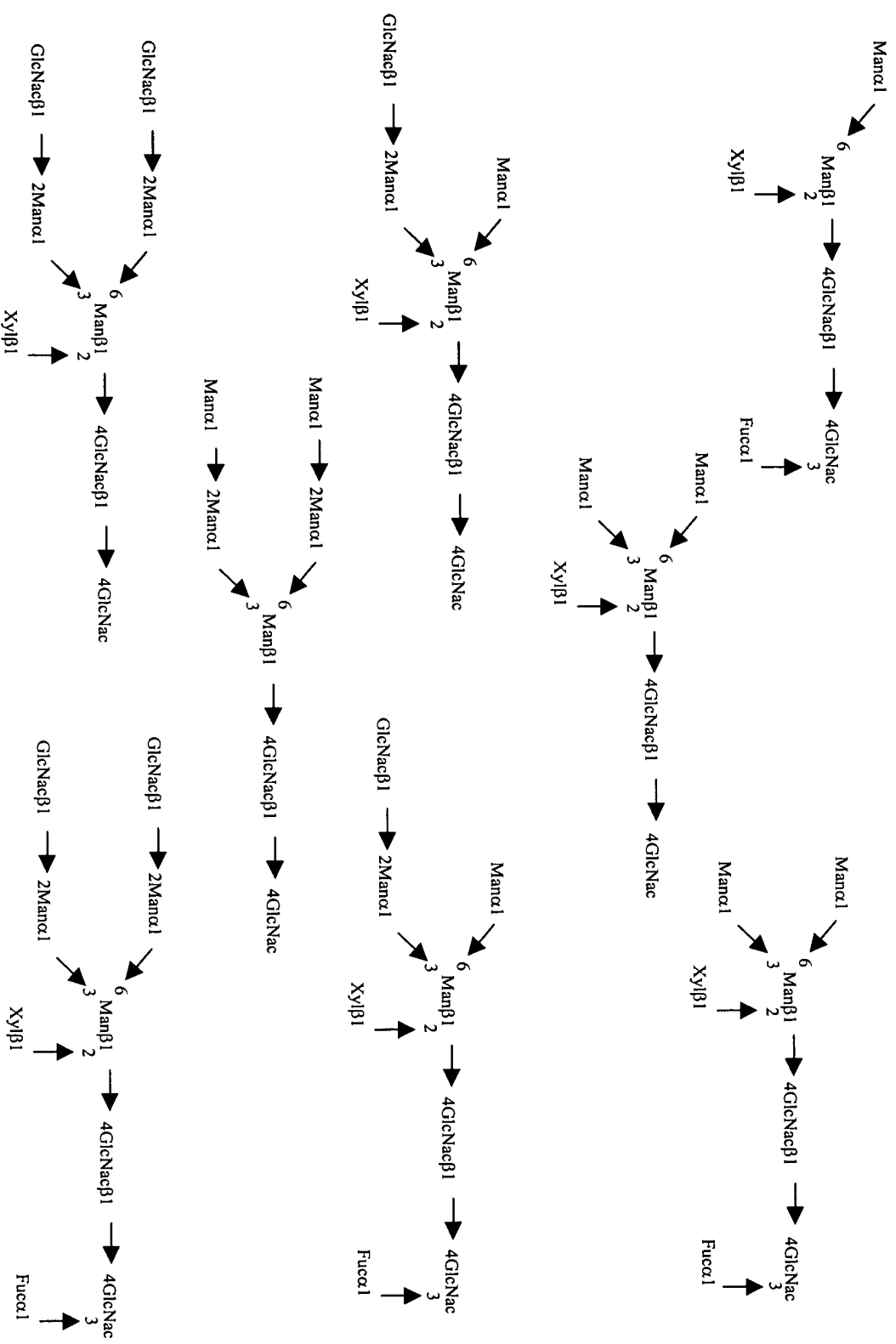


FIG. 11



## FIG. 12-1

GTATTTTACAACAATTACCAACAACAACAACAACATTACAATTACTATTTACAATTACAATGGCATACACA  
CAGACAGCTACCACATCAGCTTTGCTGGACACTGTCCGAGGAAACAACCTCCTTGGTCAATGATCTAGCAAAAGCGTCGTCT  
TTACGACACAGCGGTTGAAGAGTTTAAACGCTCGTGACGCGAGGCCCAAGGTGAACCTTTTCAAAAAGTAATAAGCGAGGAGC  
AGACGCTTATTGCTACCCGGGCGTATCCAGAATTCCAAATTACATTTTATAACACGCAAAATGCCGTGCATTGCGTTGCA  
GGTGGATTGCGATCTTTAGAACTGGAATATCTGATGATGCAAAATTCCTACGGATCATTGACTTATGACATAGGCGGGAA  
TTTTGCATCGCATCTGTTCAAGGGACGAGCATATGTACACTGCTGTATGCCCAACCTGGACGTTGAGACATCATGCGGC  
ACGAAGGCCAGAAAGACAGTATTGAACATACCTTTCTAGGCTAGAGAGAGGGGGGAAACAGTCCCCAACTTCCAAAAG  
GAAGCATTTGACAGATACGACAGAAATTCCTGAAGACGCTGTCTGTACAATACTTTCCAGACAATGCGACATCAGCCGAT  
GCAGCAATCAGGCAGAGTGTATGCCATTGCGCTACACAGCATATATGACATACCAGCCGATGAGTTCGGGGCGGCACTCT  
TGAGGAAAAATGCCATACGTGCTATGCCGCTTTCCACTTCTCTGAGAACCTGCTTCTTGAAGATTATACGTCAATTTG  
GACGAAATCAACGCGTGTTTTTCGCGCGATGGAGACAAGTTGACCTTTTCTTTTGCATCAGAGAGTACTCTTAATTATTG  
TCATAGTATTCTTAATTTCTTAAGTATGTGTGCAAACTTACTTCCCGGCTCTAATAGAGAGGTTTACATGAAGGAGT  
TTTTAGTCACCAGAGTTAATACCTGGTTTTGTAAAGTTTTCTAGAATAGATACTTTTCTTTGTACAAGGTGTGGCCCAT  
AAAAGTGTAGATAGTGAGCAGTTTATACTGCAATGGAAGACGCATGGCATTACAAAAAGACTCTTGCAATGTGCAACAG  
CGAGAGAATCCTCCTTGAGGATTCATCATCAGTCAATTACTGGTTTTCCAAAATGAGGGATATGGTCATCGTACCATTAT  
TCGACATTTCTTTGGAGACTAGTAAGAGGACGCGCAAGGAAGTCTTAGTGTCGAAGGATTTTCGTGTTTACAGTGCTTAAC  
CACATTCGAACATACCAGGCGAAAGCTTTACATACGCAATGTTTTGTCTTTGTGCAATCGATTGATCGAGGGTAAT  
CATTACGGTGTGACAGCGAGGTCCGAATGGGATGTGGACAATCTTGTGTACAATCCTTGTCCATGACGTTTACCTGC  
ATACTAAGCTTGGCGTTCTAAAGGATGACTTACTGATTAGCAAGTTTGTCTCGGTTGCAAAACGGTGTGCCAGCATGTG  
TGGGATGAGATTTTCGCTGGCGTTTGGGAACGCATTTCCCTCCGTGAAAGAGAGGCTCTTGAACAGGAACTTATCAGAGT  
GGCAGGCGACGCATTAGAGATCAGGGTGCTGATCTATATGTGACCTTCCAGCAGAGATTAGTGACTGAGTACAAGGCCT  
CTGTGGACATGCCTGCGCTTGACATTAGGAAGAAGATGGAAGAAACGGAAGTGATGTACAATGCATTTTACAGATTATCG  
GTGTTAAGGGAGTCTGACAAATTCGATGTTGATGTTTTTCCAGATGTGCCAATCTTTGGAAGTTGACCAATGACGCG  
AGCGAAGTTATAGTCGCGTCTAGCAATGAGAGCGGTCTGACTCTCACATTTGAACGACCTACTGAGCGAATGTTG  
CGTAGCTTTTACAGGATCAAGAGAAGGCTTCAAGAGGTGCTTTGGTAGTTACCTCAAGAGAAGTTGAAGAACCGTCCATG  
AAGGGTTCGATGGCCAGAGGAGAGTTACAATTAGCTGGTCTTGTCTGGAGATCATCCGGAGTCGTCTTATTCTAAGAACGA  
GGAGATAGAGTCTTTAGAGCAGTTTCATATGGCAACGGCAGATTCTGTTAATTCGTAAAGCAGATGAGCTCGATTGTGTACA  
CGGCTCCGATTAAAGTTCAGCAATGAAAACTTTATCGATAGCCTGGTAGCATCACTATCTGCTCGGTTGCTCAAGTCTC  
GTCAAGATCCTCAAGATACAGCTGCTATTGACCTTGAACCCGTCAAAAGTTTGGAGTCTTGATGTTGCATCTAGGAA  
GTGGTTAATCAAACCAACGGCCAAGAGTCATGCATGGGGTGTGTTGAAACCCACGCGAGGAAGTATCATGTGGCGCTTT  
TGGAATATGATGAGCAGGGTGTGGTGACATGCGATGATTGGAGAAGAGTAGCTGTGAGCTCTGAGTCTGTTGTTTATTCC  
GACATGGCGAACTCAGAACTCTGCGCAGACTGCTTCGAAACGGAGAACCGCATGTGAGTAGCGCAAGGTTGTTCTTGT  
GGACGGAGTTCCGGGCTGTGGGAAACCAAGAAATTTCTTCCAGGGTTAATTTTGTGAGATCTAATTTTAGTACCTG  
GGAAGCAAGCCGCGAAATGATCAGAAGACGTGCGAATTCCTCAGGGATTATGTGCGCCACGAAGGACAACGTTAAACC  
GTTGATTCTTTTATGATGAATTTTGGGAAAAGCACACGCTGTGAGTTCAAGAGGTTATTATTGATGAAGGGTTGATGTT  
GCATACTGGTGTGTTAATTTCTTGTGGCGATGTCTTGTGCGAAATTCATATGTTTACGGAGACACACAGCAGATT  
CATACATCAATAGAGTTTTCAGGATTCCTGACCCCGCCATTTTCCAAATGGAAGTTGACGAGGTGAGACACGCGAGA  
ACTACTCTCGTTGTCCAGCGATGTACACATTATCTGAACAGGAGATATGAGGGCTTTGTGATGAGCACTTCTTCCGT  
TAAAAGTCTGTTTTCGACAGGATGGTTCGGCGGAGCGCGGTGATCAATCCGATCTCAAAACCTTGCATGGCAAGATCC  
TGACTTTTACCAATCGGATAAAGAAGCTCTGCTTTCAAGAGGGTATTAGATGTTTACACTGTGCAATGCAAGGTC  
GAGACATACTCTGATGTTTCACTAGTTAGGTTAACCCCTACACCACTCTCCATCATTGACGAGACAGCCCATGTTTT  
GGTCGATTTGCAAGGCACACCTGTTGCTCAAGTACTACACTGTTGTTATGGATCCTTTAGTTAGTATCATTAGAGATC  
TAGAGAACTTAGCTCGTACTTGTAGATATGTATAAGGTGATGACAGGAACACAATAGCAATTACAGATTGACTCGGTG  
TTCAAAGGTTCCAATCTTTTGTGTCAGCGCAAGAGCTGGTGATATTTCTGATATGCAAGTTTACTATGATAAGTGTCT  
CCCAGGCAACAGCACCATGATGAATAATTTGATGCTGTTACCATGAGGTTGACTGACATTTTATTGAATGTCAAAGATT  
GCATATTGGATATGTCTAAGTCTGTTGCTGCGCTAAGGATCAAAACCACTAATACCTATGGTACGAACGGCGGCA  
GAAATGCCACGCCAGACTGGACTATTGGAATAATTTAGTGGCGATGATTAAAGGAACCTTAAACGCACCCGAGTTGTCTGG  
CATCATTGATATTGAAAATCTGCATCTTTAGTTGTAGATAAGTTTTTGTATGTTATTGCTTAAAGAAAAAAGAAAA  
CAATAAAAAATGTTTTCTTTGTTTCAAGTAGAGATCTCTCAATAGATGGTTAGAAAAGCAGGAACAGGTAACAATAGGCCAG  
CTCGCAGATTTGATTTTGTAGATTGCGCAGCTGATCAGTACAGACATGATTAAAGCACAACCAAGCAAAAAATT  
GGACACTTCAATCCAAACGGAGTACCCGGCTTTGACAGCAGATTGTGTACCATTCAAAAAGATCAATGCAATATTTGGCC  
CGTTGTTTAGTGAGCTTACTAGGCAATTACTGGACAGTGTGATTGAGCAGATTTTGTGTTTTCACAAGAAAGACACCA  
CGCAGATTGAGGATTTCTTCGGAGATCTGACAGTCATGTCCGATGGATGTTTGGAGCTGGATATATCAAAATACGA

## FIG. 12-2

CAAATCTCAGAATGAATTCCACTGTGCAGTAGAATACGAGATCTGGCGAAGATTGGGTTTTGAAGACTTCTTGGGAGAAG  
TTTGGAAACAAGGGCATAGAAAGACCACCTCAAGGATTATACCGCAGGTATAAAACTTGCATCTGGTATCAAAGAAAG  
AGCGGGGACGTCACGACGTTTCATGGAAACACTGTGATCATTGCTGCATGTTTGGCCTCGATGCTTCCGATGGAGAAAAT  
AATCAAAGGAGCCTTTTGGCGGTGACGATAGTCTGCTGTACTTTCCAAAGGGTTGTGAGTTTCCGGATGTGCAACACTCCG  
CGAATCTTATGTGGAATTTTGAAGCAAACTGTTTAAAAACAGTATGGATACTTTTGGCGAAGATATGTAATACATCAC  
GACACGAGGATGCATTGTGTATTACGATCCCCCTAAAGTTGATCTCGAACTTGGTGCTAAACACATCAAGGATTGGGAACA  
CTTGGAGGAGTTTCAAGGTCTCTTTGTGATGTGCTGTTTCCGTTGAACAAATGTGCGTATTACACACAGTTGGACGACG  
CTGTATGGGAGGTTTCATAAGACCGCCCCCTCCAGGTTTCGTTTGTATATAAAAGTCTGGTGAAGTATTGTCTGATAAAGTT  
CTTTTATAGAAGTTTGTATTATAGATGGCTCTAGTTGTTAAAGGAAAAGTGAATATCAATGAGTTTATCGACCTGACAAAA  
TGGAGAAGATCTTACCGTCGATGTTTACCCCTGTAAGAGAGTGTATGTGTTCCAAAGTTGATAAAATAATGGTTTCATGAG  
AATGAGTCATTGTGAGAGGTGAACCTTCTTAAAGGAGTTAAGCTTATTGATAGTGGATACGTCGTTTAGCCGGTTTGGT  
CGTCACGGGCGAGTGGAACTTGCTGACAATTGCGAGGAGGTTGTGAGCGTGTGCTGGTGGCAAAAGGATGGAAAGAG  
CCGACGAGGCCACTCTCGGATCTTACTACACAGCAGCTGCAAGAAAAAGATTTCAGTTCAAGGTCGTTCCCAATTATGCT  
ATAACCAACCGACGCGATGAAAAACGCTCTGGCAAGTTTGTAGTTAATATTAGAAATGTGAAGATGTGACGGGTTTCTG  
TCCGCTTTCTCTGGAGTTTGTGTGCTGCTGATTGTTTATAGAAATAATATAAAATTAGGTTTGGAGAGAGAAGATTACAA  
ACGTGAGAGACGGAGGGCCCATGGAACCTACAGAAGAAGTCTGTGATGAGTTTCATGGAAGATGTCCCTATGTGATCAGG  
CTTGCAAGTTTTCGATCTCGAACCGGAAAAAGAGTGATGTCCGCAAGGGAAAAATAGTAGTAATGATCGGTCAGTGCC  
GAACAAGAACTATAGAAATGTTAAGGATTTTGGAGGAATGAGTTTAAAAAGAATAATTTAATCGATGATGATTCGGAGG  
CTACTGTCCGCAATCGGATTCTGTTTAAATAGATCTTACAGTATCACTACTCCATCTCAGTTCGTGTTCTTGTCAATTA  
TATGCAGGTGCTGAACACCATGTTGAACAAACACTTCTGTCCCTTTCGGTCCCTCATGTCCTCCTTGGCCTCTCCTCCA  
ACTTGACAGCCGGCATGTGGAACAATGGATTGGCAAGGACGCCTACCATGGGCTGGCTGCAGTGGGAGCGCTTCATGTGC  
AACCTTGACTGCCAGGAAGAGCCAGATTCTCGACATCAGTGCAGTGAAGCTCTTCATGGAGATGGCAGAGCTCATGGTCTCAGA  
AGGCTGGAAGGATGACGATTATGAGTACCTCTGCAATTGATGAGTGTGGATGGCTCCCCAAAGAGATTGAGAAGGCAGAC  
TTCAGGCAGACCCTCAGCGCTTTCTCATGGGATTGCGCAGCTAGCTAATTATGTTTACAGCAAAAGGACTGAAGCTAGGG  
ATTTATGCAGATGTTGGAATAAAACCTGCGCAGGCTTCCCTGGGAGTTTGGATACTACGACATTGATGCCAGACCTT  
TGCTGACTGGGAGTAGATCTGCTAAAAATTGATGGTTGTTACTGTGACAGTTTGGAAAATTGGCAGATGGTTATAGC  
ACATGTCCCTTGGCCCTGAATAGGACTGGCAGAGCATTGTGTACTCCTGTGAGTGGCCTCTTTATATGTGGCCCTTTCAA  
AAGCCCAATTATACAGAAATCCGACAGTACTGCAATCACTGGCGAAATTTGTGACATTGATGATTCCTGGAAAAGTAT  
AAAGAGTATCTTGGACTGGACATCTTTTAAACAGGAGAGAATTGTTGATGTTGCTGGACCAGGGGGTTGGAATGACCCAG  
ATATGTTAGTGATTGGCAACTTTGGCCTCAGCTGGAATCAGCAAGTAACTCAGATGGCCCTCTGGGCTATCATGGCTGCT  
CCTTTATTCATGTCTAATGACCTCCGACACATCAGCCCTCAAGCCAAAGCTCTCCTTCAGGATAAGGACGTAATTGCGCAT  
CAATCAGGACCCCTTGGGCAAGCAAGGGTACCAGCTTAGACAGGGAGACAACCTTGAAGTGTGGGAACGACCTCTCTCAG  
GCTTAGCCCTGGGCTGTAGCTATGATAAACCGGCAGGAGATTGGTGGACCTCGCTCTTATACCATCGCAGTTGCTTCCCTG  
GGTAAAGGAGTGGCCTGTAATCCTGCCTGCTTCATCACACAGCTCCTCCCTGTGAAAAGGAAGCTAGGGTTCTATGAATG  
GACTTCAAGGTTAAGAAGTCACATAAATCCACAGGCACTGTTTGGCTTCAGCTAtctgaaaaggacgaattatgaCCTA  
GGCTCGCAAAGTTTTCGAACCAATCCTCAAAAAGAGGTCGAAAAATAATAAATTTAGGTAAGGGGCGTTACGGCGGA  
AGGCCATAACCAAAAAGTTTGTGAAGTTGAAAAGAGTTTGTATAATTGATTGAAGATGAAGCCGAGACGTCGGTCGC  
GGATTCTGATTTCGTATTAAATATGTCTTACTCAATCACTTCTCCATCGCAATTTGTGTTTTTGTGTCATCTGTATGGGCTGA  
CCCTATAGAATTGTTAAACGTTTGTACAAATTCGTTAGGTAACCAAGTTTCAACACAGCAAGCAAGAACTAGTTTCAAC  
AGCAGTTTCAAGGAGGTGTGGAACCTTTCCCTCAGAGCACCGTCAGATTTCTTGGCGATGTTTATAAGGTGTACAGGTAC  
AATGCAGTTTTAGATCCTCTAATTACTGCGTTGCTGGGGCTTTTGATACTAGGAATAGAATAATCGAAGTAGAAAACCA  
GCAGAGTCCGACAAACAGCTGAAACGTTAGATGCTACCCGAGGGTAGACGACGCTACGTTGCAATTCGGTCTGCTATAA  
ATAATTTAGTTAATGAACAGTAGTAAGAGGTACTGGAGTGTACAATCAGAATACTTTTGAAGTATGCTGCGGTTGGTCTGG  
ACCTCTGCACCTGCATCTTAAATGCATAGGTGCTGAAATATAAAGTTTGTGTTTCTAAAAACACAGTGGTACGTACGATA  
ACGTACAGTGTTTTTCCCTCCACTTAAATCGAAGGGTAGTGTCTTGGAGCGCGCGAGTAAACATATATGTTTCATATAT  
GTCCGTAGGCACGTAAAAAAGCGAGGGATTGCAATTCCTCCCGGAACCCCGGTTGGGGCCAGGTACCAATTCCTGAAG  
ACGAAAGGGCCTCGTGATACGCCTATTTTTATAGGTTAATGTCATGATAAATAGGTTTCTTAGACGTCAGGTGGCACTT  
TTCGGGGAATGTGCGCGGAACCCCTATTGTTTATTTTTCTAAATACATTCAAATATGTATCCGCTCATGAGACAATAA  
CCCTGATAAATGCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCACATTTCCGTGTCGCCCTTATTCCTCTTTT  
TGCGGCATTTTGCTTCCGTTTGTCTCAGCAGAAACGCTGGTGAAAGTAAAGATGCTGAAGATCAGTTGGGTGCAC  
GAGTGGGTTACATCGAATCGGATCTCAACAGCGGTAAGATCCTTGAGAGTTTTCGCCCCGAAGAAGCTTTCCAATGATG  
AGCACTTTTAAAGTTCTGATGTGGCGCGGTATATCCGCTGTGACCGCGGCAAGAGCAACTCGCTGCGCCGATACACA  
CTATTCTCAGAATGACTTGGTTGAGTACTACCAAGTCACAGAAAAGCATCTTACGGATGGCATGACAGTAAGAGAATTAT

## FIG. 12-3

GCAGTGTGCCATAACCATGAGTGATAACACTGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACCGCTTTTTTGCACAACATGGGGGATCATGTAACCTGCGCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCATACCAAACGACGAGCGTGACACCACGATGCCTGCAGCAATGGCAACAACGTTGCGCAAACTATTAAGTGGCGAACTACTTACTCTAGCTTCCCGGCAACAATTAATAGACTGGATGGAGGCGGATAAAGTTGCAGGACCACCTTCTGCGCTCGGCCCTTCCGGCTGGCTGGTTTATTGCTGATAAATCTGGAGCCGGTGAGCGTGGGTCTCGCGGTATCATTGCAGCACTGGGGCCAGATGGTAAGCCCTCCGTATCGTAGTTATCTACACGACGGGAGTCAGGCAACTATGGATGAACGAAATAGACAGATCGCTGAGATAGGTGCCTCACTGATTAAGCATTGGTAACCTGTCAGACCAAGTTTACTCATATATACTTTAGATTGATTTAAACTTCATTTTAAATTTAAAAGGATCTAGGTGAAGATCCTTTTTGATAATCTCATGACCAAAATCCCTTAACGTGAGTTTTCGTTCCACTGAGCGTACAGCCCCGTAGAAAAGATCAAAGGATCTTCTTGAGATCCTTTTTTCTGCGGTAACTCTGCTTGCACAAAACAAAAAACCAACGCTACCCAGCGGTGGTTTGTGTTGCCGGATCAAGAGCTACCAACTCTTTTTCCGAAGGTAAGTGGCTTCAGCAGAGCGCAGATACCAAATACTGTCTTCTAGTGTAGCCGTAGTTAGGCCACCCTTCAAGAACTCTGTAGCACCGCCTACATACCTCGCTCTGCTAATCCTGTTACCACTGGCTGCTGCCAGTGGCGATAAGTCGTGCTTACCGGGTTGGACTCAAGACGATAGTTACCGGATAAGGCGCAGCGGTGCGGGCTGAACGGGGGGTTCGTGCACACAGCCAGCTTGGAGCGAAGCAGCTACACCGAATGAGATACCTACAGCGTGAGCTATGAGAAAGCGCCACGCTTCCCGAAGGGAGAAAGCGGACAGGTATCCGGTAAGCGGCAGGGTCGGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGAAACGCTGGTATCTTTATAGTCTGTGCGGGTTTCGCCACCTCTGACTTGAGCGTCGATTTTGTGATGCTCGTCAGGGGGCGGAGCCTATGGAACAAACGCCAGCAACGCGGCCCTTTTACGGTTCTTGCCCTTTTGTGCTGGCCTTTTGTCTCACATGTTCTTCTGCGTTATCCCTGATTCTGTGGATAACCGTATACCGCCTTTGAGTGAGCTGATACCGCTCGCCGAGCGAAGCAGCCGAGCGCAGCGAGTCAGTGAGCGAGGAAGCGGAAGAGCGCCTGATGCGGTATTTTCTCCTTACGCATCTGTGCGGTATTTACACCGCATATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTTAAGCCAGTATACACTCCGCTATCGCTACGTGACTGGGTCTAGGCTGCGCCCGACACCCGCCAACACCCGCTGACGCGCCCTGACGGGCTTGTCTGCTCCCGCATCCGCTTACAGACAAGCTGTGACCGTCTCCGGGAGCTGCATGTGTGAGAGTTTTACCGTCAACCGAAACGCGCAGGCAGCTGCGGTAAAGCTCATCAGCGTGGTCTGTAAGCGATTACAGATGTCTGCCTGTTTCACTCCGCTCCAGCTCGTTGAGTTTCTCCAGAAGCGTTAATGTCTGGCTTCTGATAAAGCGGGCCATGTTAAGGGCGGTTTTTCTGTTTGGTCACTTGATGCCTCCGTGTAAGGGGAATTTCTGTTTATGGGGGTAATGATACCGATGAAACGAGAGAGGATGCTACGATACGGGTTACTGATGATGAACATGCCCCGTTACTGGAACGTTGTGAGGGTAAACAACTGGCGGTATGGATGCGGCGGGACCAGAGAAAAATCACTCAGGGTCAATGCCAGCGCTTCTGTTAATACAGATGTAGGTTTCCACAGGGTAGCCAGCAGCATCCTGCGATGCAGATCCGGAACATAATGGTGAGGGCGCTGACTTCCGCGTTTCCAGACTTTACGAACACGGAACCGAAGACCATTTCATGTTGTTGCTCAGGTGCGAGACGTTTTGACAGCAGCAGTCGCTTCACGTTTCGCTCGCGTATCGGTGATTCATTCTGCTAACCAAGTAAGGCAACCCCGCAGCCTAGCCGGGTCTCAACGACAGGAGCAGCATATGCGCACCCGTGGCCAGGACCAACGCTGCCCCGAGATGCGCCGCGTGGGCTGCTGGAGATGGCGGACGCGATGGATATGTTCTGCCAAGGGTTGGTTTGGCATTTCACAGTTCTCCGCAAGAATTGATTGGCTCCAATTTCTGGAGTGGTGAATCCGTTAGCGAGGTGCCGCCGGCTTCATTTCAGGTGAGGTGGCCCGGCTCCATGCACCGCGACGCAACGCGGGGAGGCAGACAAGGTATAGGGCGGCGCTACAATCCATGCCAACCCGTTCCATGTGCTCGCCGAGGCGGCATAAATCGCCGTGACGATCAGCGGTCCAGTGATCGAAGTTAGGCTGGTAAGAGCCGCGAGCGATCCTTGAAGCTGTCCCTGATGGTCTCATCTACCTGCTGGACAGCATGGCCTGCAACGCGGGCATCCCGATGCCGCGGAAGCGAGAAGAATCATAATGGGGAAAGCCATCCAGCCTCGCGTCGCGAACGCCAGCAAGACGTAGCCAGCGCGTGGGCCCATGCCGGCGATAATGGCCTGCTTCTCGCCGAAACGTTTGGTGGCGGGACAGTGACGAAGCTTGAGCGAGGGCGTGCAAGATTCGAATACCGCAAGCGACAGGCCGATCATCGTCGCGCTCCAGCGAAAGCGGTCTCGCCGAAAATGACCCAGAGCGCTGCCGGCACCTGTCTACGAGTTGCATGATAAAGAAGACAGTCATAAGTGCGGCGACGATAGTCATGCCCGCGCCACCGGAAGGAGCTGACTGGGTTGAAGGTCTCAAGGGCATCGGTGAGATTTAGGTGACACTATA

FIG. 13-1

GTATTTTACAACAATTACCAACAACAACAACAACAGACAACATTACAATTACTATTTACAATTACAATGGCATAACA  
CAGACAGCTACCACATCAGCTTTGCTGGACACTGTCCGAGGAAACAACCTCTTGGTCAATGATCTAGCAAAGCGTCGTCT  
TTACGACACAGCGGTTGAAGAGTTTAAACGCTCGTGACCGCAGGCCAAGGTGAACCTTTTCAAAAGTAATAAGCGAGGAGC  
AGACGCTTATTGCTACCCGGGCGTATCCAGAATTCCAAATTACATTTTATAACACGCAAAATGCCGTGCATTTCGCTTGCA  
GGTGGATTGCGATCTTTAGAACTGGAATATCTGATGATGCAAAATCCCTACGGATCATTGACTTATGACATAGGCGGGAA  
TTTTGCATCGCATCTGTTCAAGGGACGAGCATATGTACACTGCTGCATGCCAACCTGGACGTTTCGAGACATCATGCGGC  
ACGAAGGCCAGAAAGACATTTGAACATATACCTTTCTAGGCTAGAGAGAGGGGGGAAAACAGTCCCCAACTTCCAAAAG  
GAAGCATTTGACAGATACGCAGAAATTCCTGAAGACGCTGTCTGTCAACAATCTTTCCAGACATGCGAACATCAGCCGAT  
GCAGCAATCAGGCAGAGTGTATGCCATTGCGCTACACAGCATATATGACATACCAGCCGATGAGTTTCGGGGCGGCACCTCT  
TGAGGAAAAATGTCCATACGTGCTATGCCGCTTTCCACTTCTCCGAGAACCTGCTTCTTGAAGATTCATGCGTCAATTTG  
GACGAAATCAACGCGTGTCTTTTCGCGCGATGGAGACAAGTTGACCTTTTCTTTGCATCAGAGAGTACTCTTAATTACTG  
TCATAGTTATTCTAATATTCTTAAGTATGTGTGCAAACTTACTTCCCGCCTCTAATAGAGAGGTTTACATGAAGGAGT  
TTTTAGTCACCAGAGTTAATACCTGCTTTTGTAAAGTTTCTAGAAATAGATACTTTCTTTTGTACAAAGGTGTGGCCCAT  
AAAAGTGTAGATGTGAGCAGTTTATACTGCAATGGAAGACGCATGGCATTACAAAAGACTCTTGCAATGTGCAACAG  
CGAGAGAATCCTCTTGGGGATTATCATCAGTCAATTACTGCTTTCCCAAATGAGGGATATGGTTCATGCTACCATTAG  
TCGACATTTCTTTGGAGACTAGTAAGAGGACGCGCAAGGAAGTCTTAGTGTCGAAGGATTTCTGTTTACAGTGCTTAAC  
CACATTCGAACATACCAGGCGAAAGCTCTTACATACGCAATGTTTGTCTTCGTCGAATCGATTTCGATCGAGGGTAAT  
CATTAAACGGTGTGACAGCGAGGTCGAATGGGATGTGGACAATCTTGTGTACAATCCTTGTCCATGACGTTTTACCTGC  
ATACTAAGCTTCCGTTCTAAAGGATGACTTACTGATTAGCAAGTTAGTCTCGGTTTCGAAAACGGTGTGCCAGCATGTG  
TGGGATGAGATTTCTGCTGGCGTTTGGGAACGCATTTCCCTCCGTGAAAGAGAGGCTCTTGAACAGGAACTTATCAGAGT  
GGCAGGCGACGCATTAGAGATCAGGGTGCCTGATCTATATGTGACCTTCCACGACAGATTAGTGACTGAGTACAAGGCCT  
CTGTGGACATGCTGCGCTTGACATTAGGAAGAAGATGGAAGAAACGGAAGTGATGTACAATGCACTTTTCAAGATTATCG  
GTGTTAAGGGAGTCTGACAAATTCGATGTTGATGTTTTTCCCAGATGTGCCAATCTTTGGAAGTTGACCAATGACGGC  
AGCGAAGGTTATAGTCGCGGTATGAGCAATGAGAGCGGTCTGACTCTCACATTTGAACGACCTACTGAGGCGAATGTTG  
CGCTAGCTTTACAGGATCAAGAGAAGGCTTCAGAAGGTGCATTGGTAGTTACCTCAAGAGAAGTTGAAGAACCGTCCATG  
AAGGGTTTCGATGGCCAGAGGAGAGTTACAATTAGCTGGTCTTGTGGAGATCATCCGGAATCGTCTTATCTAAGAACGA  
GGAGATAGAGTCTTTAGAGCAGTTTCATATGGCGACGCGAGATTCTGTTAATTCGTAAGCAGATGAGCTCGATTGTGTACA  
CGGTTCCGATTAAAGTTTCAGCAAAATGAAAACTTTATCGATAGCCCTGGTAGCATCACTATCTGCTGCGGTGTCGAATCTC  
GTCAAGATCCTCAAAGATACAGCTGCTATTGACCTTGAACCCGTCAAAAGTTTGGAGTCTTGGATGTTGTCATCTAGGAA  
GTGGTTAATCAAACCAACGGCCAAAGAGTCATGCATGGGGTGTGTTGAAACCCACGCGAGGGAGTATCATGTGGCGCTTT  
TGGAAATATGATGAGCAGGGTGTGGTGACATGCGATGATTGGAGAAGAGTAGCTGTTAGCTCTGAGTCTGTTGTTTATTCC  
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## FIG. 13-2

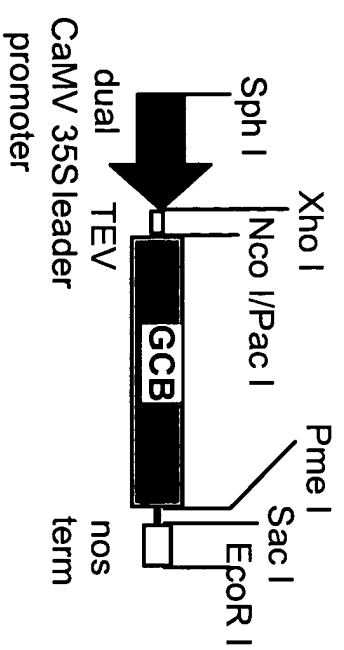
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# TRANSGENIC VECTOR FOR rGCB EXPRESSION

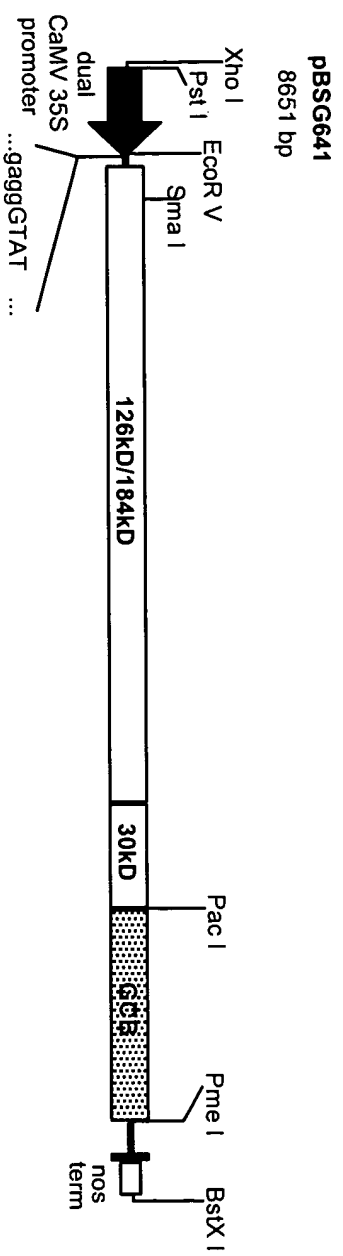
**pBSG638**

2761 bp



**FIG. 14**

# VIRAL VECTOR FOR rGCB EXPRESSION



**FIG. 15**